Goddard Space Flight Center SPI

GSFC

An Overview of Project Planning Concepts

August 2006

Presented by: Ella Page

Software Process Improvement (SPI) Project

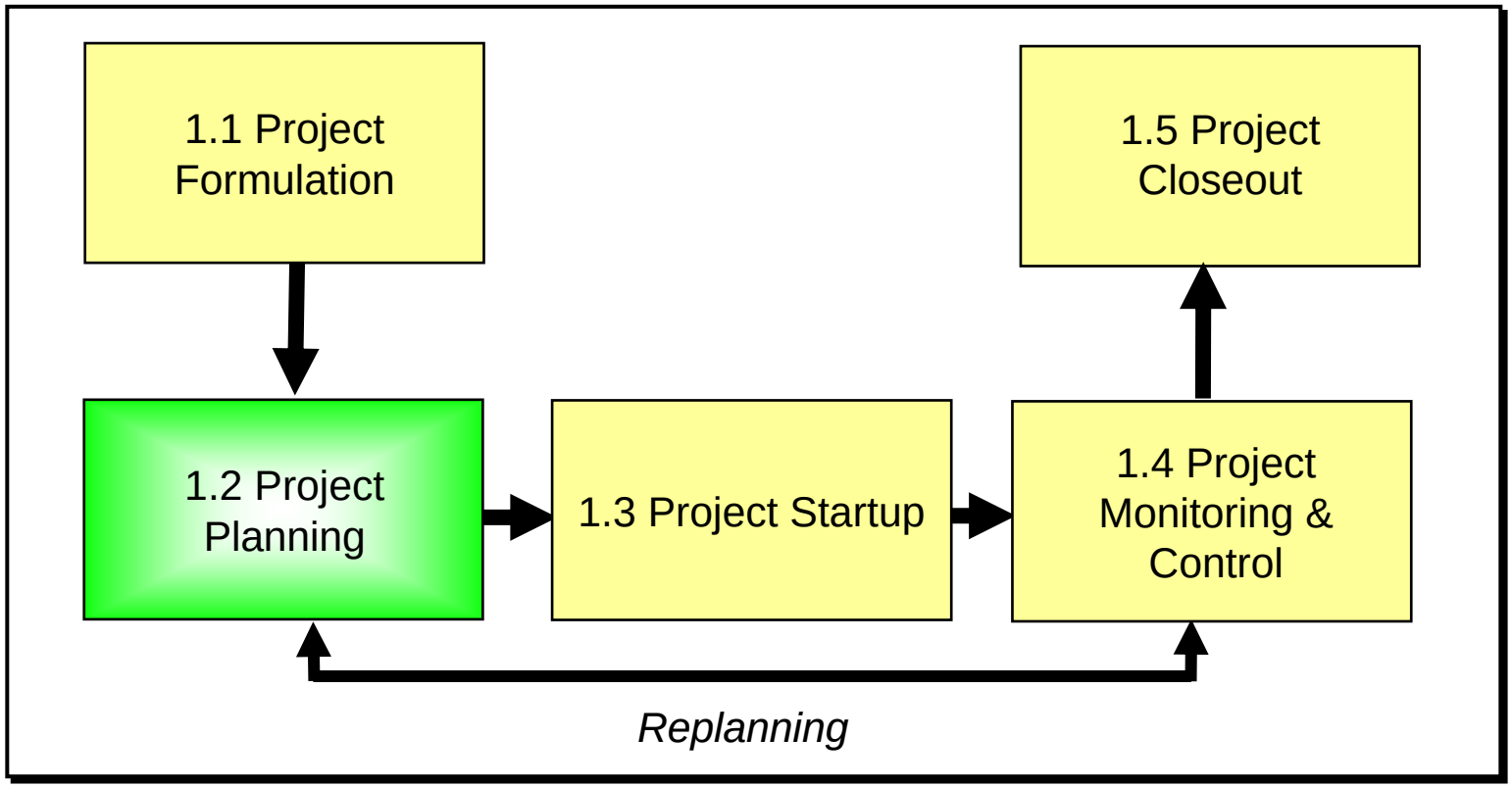
Agenda

- Important Aspects of Project Planning
- Documenting Your Plan in the Software Management Plan/Product Plan (SMP/PP)
- Planning Pitfalls

Purpose and Objectives

- **Purpose: Describe the high-level Project Planning Process**
- **Objective - After this session you should understand:**
  - **The importance of customer agreements**
  - **How to create your project Work Breakdown Structure (WBS)**
  - **How to schedule your work and estimate resources**
  - **What needs to be documented in your SMP/PP**
  - **Some of the pitfalls in project planning**

The Planning Process Context



A Major Planning Rule

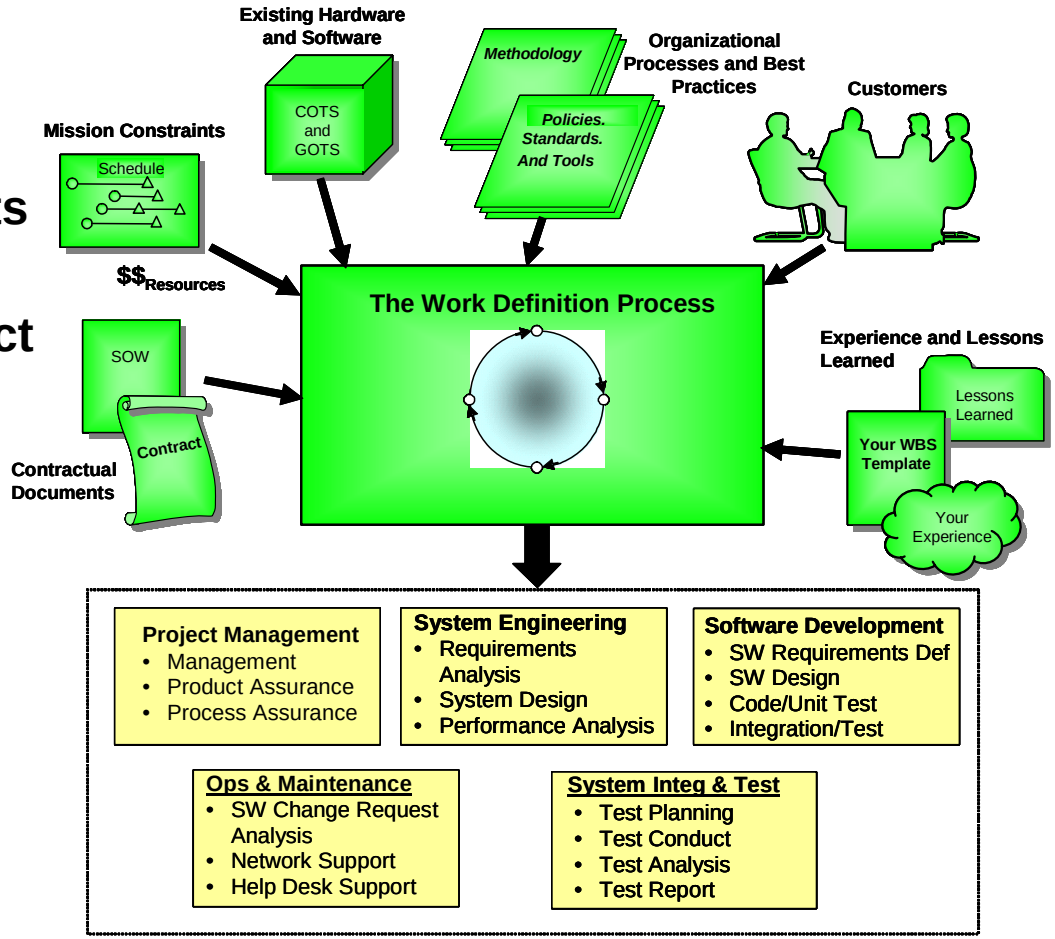
Proper Planning Prevents Poor Performance

Important Aspects of Project Planning

- Defining the work and approach
  - Customer agreements
  - Management work approaches, including measurement and reporting
  - Technical work approaches
  - CM and QA work approaches
- Defining the project WBS
- Estimating resource requirements
- Creating the project schedule and staffing profile
- Defining project risks and mitigation approaches
- Iterating on the plan
- Documenting the project plan

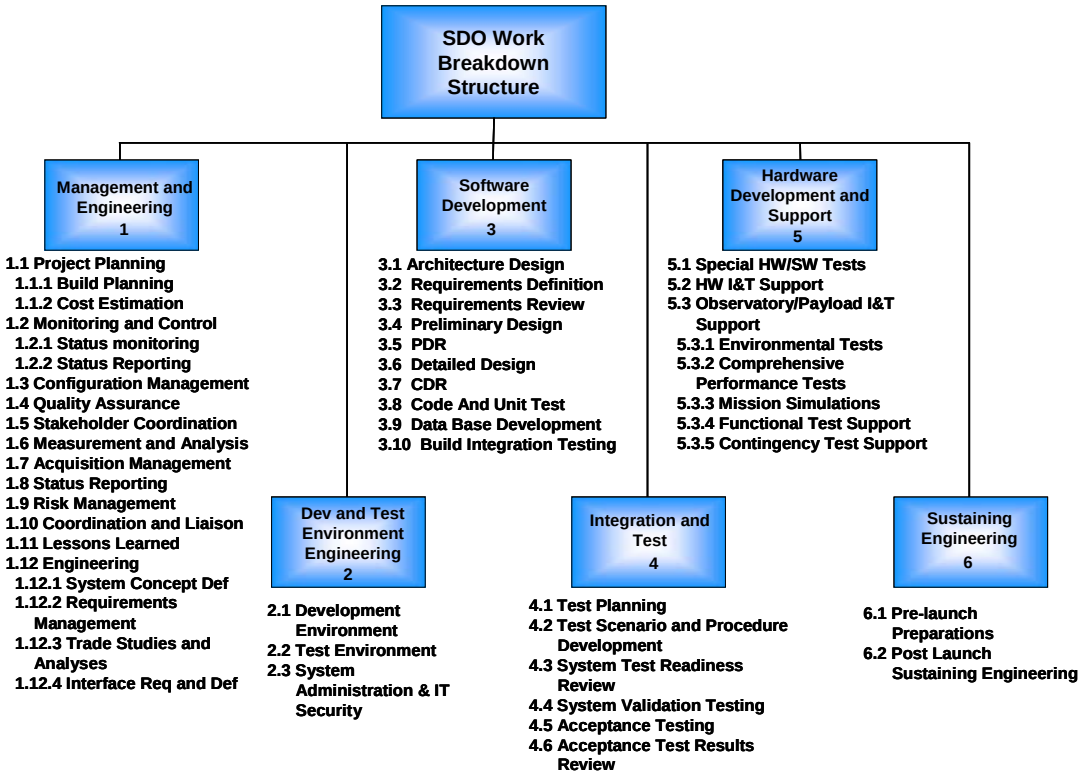
Define the Work and Approach

- Scope your project
  - Group like products
  - Break into sub-products
  - Identify work elements needed for each product and sub-product
- Use as many input references as you can
  - Your customer
  - Your contract or SOW
  - Mission schedules
  - PAL assets
  - Your experience with each approach



Define the Project WBS

- Use a WBS checklist*
- Include work elements identified for each product and sub-product
- Include all project management work
  - Monitoring and controlling
  - Measuring and reporting
  - CM and QA
  - Coordination and interface
  - Risk Management
- Include all technical work
  - Requirements and design
  - Integration and test
  - Sustaining support



Reference the ISD Guidelines for the WBS, Asset 1.2.4.1 at http://software.gsfc.nasa.gov/ISDpaAll.cfm

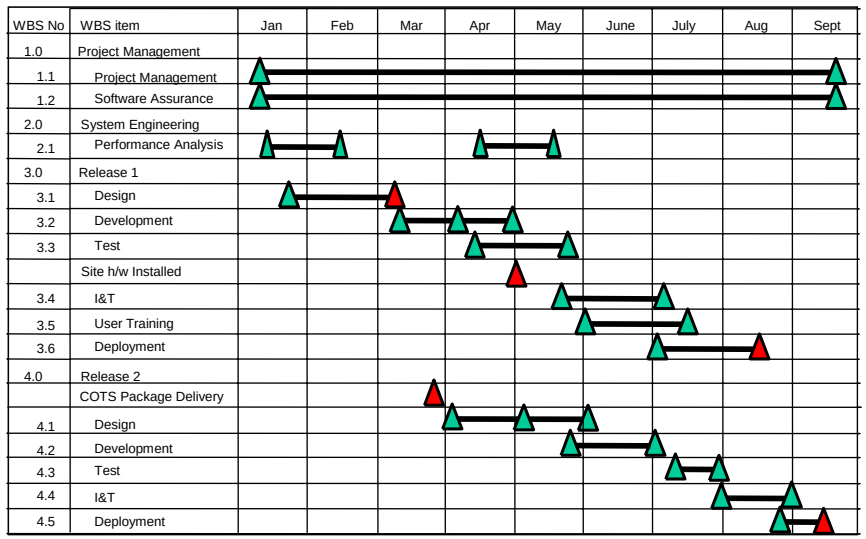
Estimate the Resource Requirements

- **Estimate at lower level WBS activities and roll the result up for high-level estimates**
- **Steps in creating a Basis of Estimate (BOE) include:**
  - **Estimate the size or count of the work product (lines of code, function points, object points, number of requirements, interfaces, etc.)**
  - **Include sizing estimates for other deliverables such as documentation and services required**
  - **Identify new, existing, or modified software products**
  - **Assess complexity of each product**
  - **Use historical data from similar work to estimate resources required**
- **Assess the risk associated with your estimate and adjust accordingly**
  - **Consider a best-case estimate, a worst-case estimate, and a moderate case estimate**
  - **Based on range of estimates, pick a reasonable estimate**

Remember … software estimation is an uncertain business so use all resources available to improve your estimate.

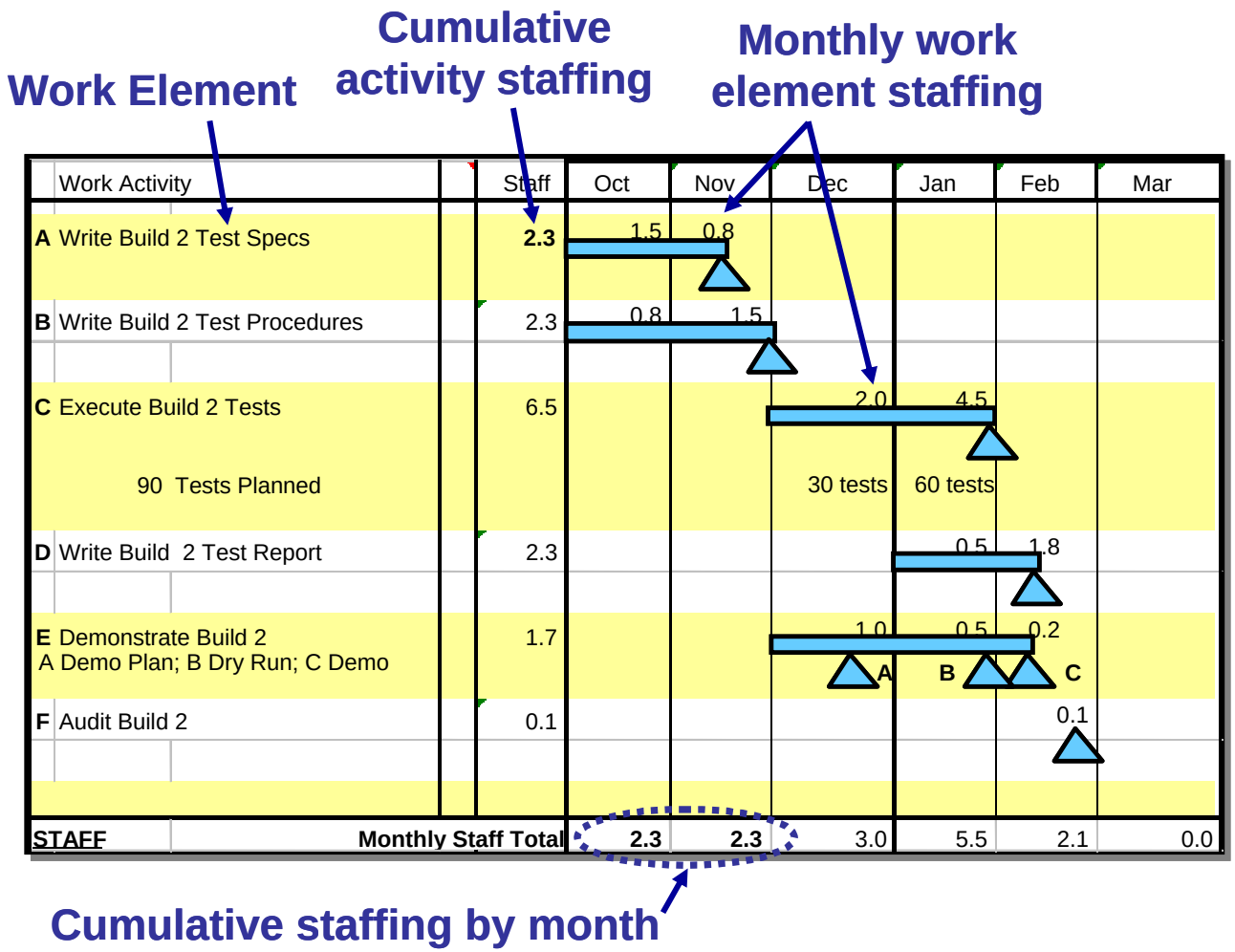
Create Your Project Schedule

- Use your WBS as the activity list
- Include major Mission Milestones where you have dependencies
- Begin by "backing into" the schedule based on mission schedules
- Reconcile schedule input from multiple team experts
- Identify dependencies and critical path activities
- Add to the WBS if you identify new activities during scheduling
- Iterate on the WBS and schedule creation process
- Validate through "bottom up" scheduling to ensure adequate time has been provided



Map Resources to the Work

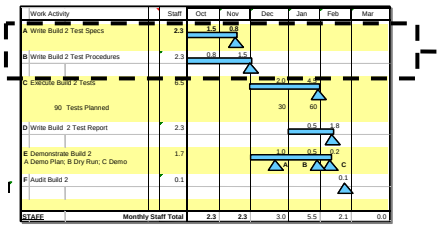
- Map the estimated resources over time to work
  - Map at lowest work element
  - Use a tool (e.g., a spreadsheet)



Establish Your Staffing Profile

Next map project roles to work elements

- Identify roles needed by work element and by month
- Reconcile total by work element with total by role



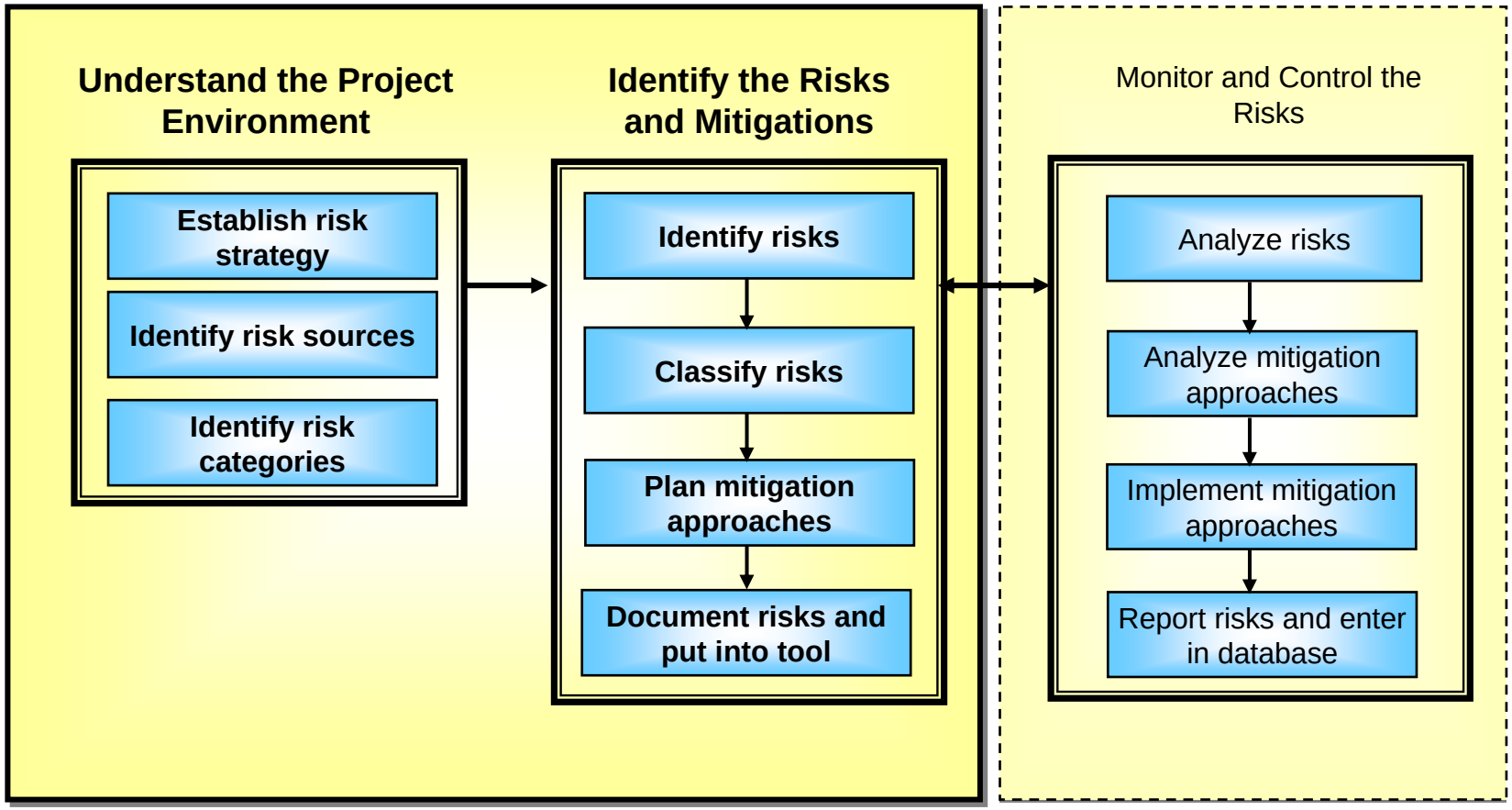
Work Activity	Staff	Oct	Nov	Dec
A Write Build 2 Test Specs	**2.3**			
Test Team Lead		0.4	0.2	
Test Engineer		1.0	0.6	
Technician		0.1	0.0	
B Write Build 2 Test Procedures	**2.3**			
Test Team Lead		0.2	0.4	
Test Engineer		0.5	0.9	
Technician		0.1	0.2	
Monthly Staff Total		**2.3**	**2.3**	
Test Team Lead		0.6	0.6	
Test Engineer		1.5	1.5	
Technician		0.2	0.2	
Total by Month		**2.3**	**2.3**	

Identify roles required for each work element

Sum required roles by month

Ensure the monthly totals by role and work element are the same

Define the Risks and Mitigations



Iterate on Your Plan

- Ensure all needed work is planned
- Ensure level of detail is such that progress can be objectively measured
- Ensure plans for measurement are in place
- Check tiering of schedules
- Reconcile allocated resource and initial resource estimate

Document Your Project Plan

- **Customer Agreements**
  - What your customer expects from you
  - How you can prove you provided it
  - How you'll keep customers involved
  - What you need from your customer
- **Management Approach**
  - Your plan for getting the work done
  - Your plan for monitoring and controlling the work
  - Records and reporting you need to do
- **Technical Approach**
  - How you'll do software requirements definition, development, test, and integration
  - Your build/release approach
  - Your delivery and maintenance approach
- **Product Control and Assurance**
  - How you'll do CM and Data Management
  - How you'll ensure quality in project products and processes

Software Management Plan/Product Plan (SMP/PP) Contents

1 Introduction

2 Customer Agreement

3 Software Management Approach

4 Software Technical Approach

5 Product Control and Assurance*

Appendix A: Acronyms

Appendix B: System/Subsystem Classifications*

Appendix C: Tailoring Matrix for Compliance with NPR 7150.2*

** Not included in template for Class D/E projects, but basic Product Control and Assurance plans are included in Section 4.*

Operating Plan versus Replan

- **Replanning *modifies the baseline plan* to address changes in the scope of work, the resources, or the schedule**
  - **A new baseline plan is created (but the old is maintained in the data archive)**
  - **Do a replan for**
    - **Formal changes in scope, resources, or schedule**
    - **At end of life cycle phases to correct *major* variances in planned versus actual performance**
- **An operating plan *reflects how you intend to eliminate variances* and get back on your baseline plan**
  - **The baseline plan does not change**
  - **The operating plan is not baselined**

If you are constantly replanning, you have no real plan.

Keeping Records

- **All products of the planning process should be kept in the project data stores, for example:**
  - **The completed SMP/PP and subsequent modifications**
  - **Related planning artifacts like:**
    - **Program Operating Plan (POP)**
    - **Staffing plan**
    - **Data Management Plan**
    - **Schedule**
  - **All Basis of Estimate (BOE) data**
  - **Interim planning products associated with planning processes, for example**
    - **Minutes from customer and stakeholder meetings**
    - **Minutes from internal planning meetings, for example:**
      - Make/buy rationale
      - Interim deliverable lists and dates
      - Schedule constraints and rationale
      - Potential risks not in risk list

Watch Out for Planning Pitfalls

- **Customers – Not knowing who all your customers are, not hearing what the customer is really looking for; not documenting agreements**
- **WBS – Failing to identify all work or to go to a level low enough**
- **Schedule – Not having enough milestones to assess performance; not recognizing schedule dependencies; having inconsistent upper and lower level schedules**
- **Estimation – Not using a good basis of estimation for product size or effort**
- **Staffing Profile – Failing to address peaks, troughs, steep ramp-ups, or steep ramp-downs**
- **Risks – Failing to recognize important risk areas, or not planning risk avoidance or mitigation approaches**

Summary

- Good planning at the beginning will make your job easier throughout the project
- Make sure your WBS defines ALL work to be done (coordination, management, technical, and support)
- Look internally as well as externally for Project risks
- Include measurement activities in your plan and project execution
- Use past history and lessons learned in scheduling and estimating the work
- Define who is responsible for each work activity
- Document your plan and iterate until all areas are covered
- Use the plan, and replan only when necessary

Questions?